Rocky Flats Environmental Technology Site

Survey Control Network Report

Submitted by

Flatirons Surveying, Inc.

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Introduction

Flatirons Surveying, Inc. (FSI) of Boulder, CO established a survey control network to provide limited coverage of the Rocky Flats Environmental Technology Site (RFETS) for the purpose of surveying with Real Time Kinematic (RTK) Global Positioning System (GPS). Control was established to horizontal and vertical first order accuracy (Horizontal Class I, Vertical Class II based on Federal Geodetic Control Committee Standards). From August 15 – September 8, 2005 FSI performed fieldwork, processed data, and delivered information to Kaiser-Hill (KH). FSI is contracted to URS Corporation (URS), which is contracted to Kaiser-Hill Corporation. Jason Jung directed this project for FSI.

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80301

II. Location

Rocky Flats Environmental Technology Site is located in Jefferson County, Colorado. The industrial area of this site is approximately 2 miles long by 1.5 miles wide. Its surficial soil deposits consist of Rocky Flats Alluvium and artificial fill materials *(EG&G 1992)*. These soils contain coarse sands, poorly sorted, unconsolidated coarse gravels, and gravelly clays with discontinuous lenses of clay, silt, and sand *(Final Buffer Zone Sampling and Analysis Plan)*.

III. Conditions

As RFETS nears closure, conditions were extremely variable and changed daily. A verbal task order was provided (number and date not provided to FSI) and work performed under the direction of Tom Lindsay of Safe Sites, LLC, who is contracted to KH as the Project Manager for Land Configuration at RFETS. Numerous site sectors are closed and required permits, which were obtained for FSI by Tom Hanson. Tom Hanson is the Project Manager for URS and the administrator of the FSI contract. Time was the most important factor influencing control placement. At the client's request "all work needs to be completed by the end of the federal fiscal year." Bob Davis, Project Director in charge of Land Configuration for Kaiser-Hill Corporation, chose all control locations. According to Mr. Davis, control locations were chosen based on contractual site closure requirements agreed upon between KH and the US Department of Energy. Because of time constraints, National Geodetic Survey (NGS) Bluebook Monumentation Standards could not be met.

IV. Field Work

Jason Jung and Chad McFadden of Flatirons Surveying, Inc completed reconnaissance and preparation of the project. This included existing site drawing assessments, multiple field visits, and historical control investigation. Jason Jung and Chad McFadden designed the network with consultation from Devin Kowbuz of Flatirons Surveying, Inc (B.S. Geomatics Engineering, University of Calgary) and Matt Nawrocki of Vectors, Inc. The network design was submitted to and approved by Joseph Chumbley, *PLS* of CH2Mhill. The control network consisted of 11 stations at first order accuracy. The survey contained 11 of 11 or 100% with double occupation and 6 of 11 or 54.55% with triple (or greater) occupation. In addition, 2 of 22 or 9.1% of baselines will have repeat observations to provide redundant baselines. For conventional surveying, 4 of 11 or 36.36% are intervisible. Consideration was given to optimum satellite coverage during observations. Existing NGS control was used to establish horizontal control including:

- TT 23 J
- JEFFCO RESET

Our session method occupied points using four receivers, which allowed more efficient fieldwork and good geometry for site coverage. Field observations were made using Trimble 5700 GPS receivers using Zephyr Geodetic antennas or 5800 GPS receivers with R8/5800 Internal antennas and performed by FSI staff in accordance with CDOT static GPS survey procedures (Chapter 3, *GPS Surveys*, October, 2003). FSI equipment dedicated to control work was used for GPS set up. A zero baseline calibration was not performed due to time-constraints.

Mission planning was designed to incorporate remaining existing monumentation, which is given in Rocky Flats Coordinates System. Observations were made in GRS80 datum. Horizontal and vertical coordinates are in NAD 83(1992) and NAVD 88 (derived through Geoid99). Due to time constraints and clients request, differential leveling was not performed.

Monuments were purchased and set by FSI. These are 3.25" brass caps mounted on finned steel rods. They were center punched and contained an identifying 4 digit point number. As well, Carsonite reference posts were set at each location. Normal weather conditions for Rocky Flats for this time of year prevailed during work. It was mostly sunny with temperatures in the 80's (F), and Westerly winds of 10-15 knots. The following FSI personnel perform fieldwork:

- Jason Jung, *LSIT* Survey Manager (field observations, data processing, reporting)
- Chad McFadden, Project Manager (field observations, data processing, reporting)
- Jeff English (field observations)
- Eric Padia (field observations)
- Derek Leapoldt (field observations)
- Steve Downing (field observations)
- Charles Sorg (set points, field observations)
- Ben Reeves (set points, field observations)

All survey work was performed in accordance with RFETS standard operating procedures listed in the URS Site Characterization Health and Safety Plan, which included, Job Hazard Assessments, Pre-Evolution Briefings, and Plan of the Day meetings.

V. Data Processing

Data was downloaded daily from each receiver to a FSI computer with an AMD-64 processor @ 2200 Mhz, 2 GB of RAM, 150 GB of hard drive space and running Windows 2000. Data analysis, checks, and adjustments were performed using Trimble Geomatics Office (TGO) v.1.62. No problems were encountered with this process. Jason Jung and Chad McFadden prepared deliverables, including drawings, point descriptions, GPS vector solutions, and adjustments. FSI proposed using TT 24 J as the initial occupation point, however at the start of observations, another surveyor occupied TT 24 J. In order to expedite fieldwork, we used TT 23 J, which is of equal proximity and accuracy. A Minimum Constraint Adjustment was performed using TT 23 J. A Full Constraint Adjustment was performed using TT 23 J and JEFFCO RESET. For the adjustment, all points were weighted evenly as unknown points. After the passing Chi squared test, this completed the Least Squares Adjustment. The residuals for the adjustment can be found in the attached report. Additionally, no outliers were found, thus no vectors were eliminated or edited. Post processing of loop closures was conducted and the report is attached.

VI. Comments

This project was completed ahead of schedule, and under budget. No additional staff was required to continue normal site operations for projects supported by Flatirons staff. Although the fieldwork was brief, it contributed to a heavier than normal workload.

Rocky Flats Site Closure Datum points included in drawing and spreadsheet were translated from NAD27 to the Rocky Flats historical grid datum. The mean difference between NAD27 and RF is approximately 0.6 USFT. Original RF datum documents were unavailable for review (data classified), thus vertical and horizontal datum sources for RF are unknown. Errors between datums coincide with inherent errors in NAD27.

Special Note: The following information is intended as reference information for all site work completed by FSI, which is beyond the scope of this project. It is mentioned at the request of multiple project managers.

Additionally, site surveying by Flatirons Inc. and others (Merrick, Drexel Barrel & Co., Montgomery Phillips, Inc., EG & G, etc...) was performed in this datum (possibly other datums for the aforementioned companies). Flatirons GPS was calibrated for normal site operations by using a hybrid of available historical control from Montgomery Phillips, Inc. (former site survey company) and Rocky Flats posted control data.

VII. Attachments

Observation Schedule
Conversion Factors
Coordinate List
NGS Data Sheets
Reports
Project Drawing

SESSION	POINTS OBSERVED IN SESSION	POSITION FOR NEXT SESSION
A	TT 24 J	BASE
A	1001	HINGE
A	1002	HINGE
A	1003	HINGE
B	1001	HINGE
B	1002	1007
B	1003	1008
B	1004	HINGE
C	1001	1003
C	1004	HINGE
C	1007	HINGE
C	1008	1005
D	1003	1006
D	1004	1010
D	1005	HINGE
D	1007	HINGE
E	1005	1008
E	1006	1011
E	1007	HINGE
E	1010	HINGE
F	1007	1009
F	1008	1006
F	1010	HINGE
F	1011	HINGE
G	1006	JEFFCO RESET
G	1009	HINGE
G	1010	END
G	1011	HINGE
H	1009	END
H	1011	END
H	JEFFCO RESET	END

The following explains the processes for changing coordinates between Colorado State Plane and Rocky Flats Coordinate System.

State Plane to Rocky Flats Coordinate System:

1. Insert the following points into the State Plane Coordinate System drawing:

State Plane Coordinates

Point	Northing	Easting	Elevation	Description
3	747633.2251	2078764.6108	6093.5700	LEV=FB2/61
200	750471.8406	2080805.3185	6039.2000	
201	751475.8703	2082101.6792	6007.7300	
202	749491.2460	2086607.1040	0.0000	
208	749979.3939	2088943.9068	0.0000	

2. Scale the entire drawing around base point 0,0,6000 (x, y, z) by the factor 1.00025586417. The coordinate results from this action result in modified State Plane coordinates, with the inserted points having coordinates as follows.

Modified State Plane Coordinates

Point	Northing	Easting	Elevation	Description
3	747824.519	2081337.722	6093.5700	LEV=FB2/61
200	750663.859	2081337.722	6039.2000	
201	751668.146	2082634.414	6007.7300	
202	749683.014	2087140.992	0.0000	
208	750171.288	2089478.391	0.0000	

3. Move the entire drawing, using Point 202 (2087140.992,749683.014 (x, y)) as the base point and moving it to 23500,36500 (x, y).

4. Rotate the entire drawing around base point Point 202 (23500,36500 (x, y)) –0.1891666 degrees. The resulting drawing is in Rocky Flats Coordinate System, and should be verified by checking that the coordinates of the inserted points are as follows.

Rocky Flats Coordinate System

Point	Northing	Easting	Elevation	Description
3	34667.4130	15649.4070	6093.5700	LEV=FB2/61
200	37500.0000	17700.0000	6039.2000	
201	38500.0000	19000.0010	6007.7300	
202	36500.0000	23500.0000	0.0000	
208	36980.5530	25839.0000	0.0000	

Rocky Flats to State Plane Coordinate System:

1. Insert the points from step 4 under State Plane to Rocky Flats Coordinate System above into the Rocky Flats Coordinate System drawing.

2. Rotate the entire drawing around base point Point 202 (23500,36500 (x, y)) +0.1891666 degrees.

3. Move the entire drawing, using Point 202 (23500,36500 (x, y)) as the base point and moving it to 2087140.992,749683.014 (x, y). This result is Modified State Plane Coordinates that can be crosschecked with the coordinates in Step 2 under State Plane to Rocky Flats Coordinates System above.

4. Scale the entire drawing around base point 0,0,6000 (x, y, z) by the factor 0.999744201298. The resulting drawing is in the State Plane Coordinate System, and should be verified by checking that the coordinates of the inserted points are as listed in Step 1 under State Plane to Rocky Flats Coordinates System above.

NAD83 (1992) State Plane Datum Coordinates GRID Colorado Central Zone 502				
POINT NUMBER	**NORTHING**	**EASTING**	**ELEVATION**	**DESCRIPTION**
1000	1763000.772	3074799.454	5901.81	TT23J
1001	1747376.888	3079339.68	6036.03	1001
1002	1749384.202	3079824.628	6064.65	1002
1003	1750481.766	3080651.026	6042.51	1003
1004	1749813.815	3082752.124	6009.90	1004
1005	1751485.849	3081947.333	6011.02	1005
1006	1753139.167	3083021.528	5985.60	1006
1007	1750102.121	3084635.336	5976.88	1007
1008	1747442.626	3085394.3	5851.99	1008
1009	1753270.843	3089530.499	5764.37	1009
1010	1751523.094	3087721.785	5916.45	1010
1011	1746991.763	3087764.048	5904.75	1011
1015	1757316.703	3112964.13	5557.78	JEFFCO RESET

NAD27 State Plane Datum Coordinates GRID Colorado Central Zone 502				
POINT NUMBER	**NORTHING**	**EASTING**	**ELEVATION**	**DESCRIPTION**
1000	762991.136	2074954.101	5901.81	TT23J
1001	747367.46	2079494.384	6036.03	1001
1002	749374.759	2079979.315	6064.65	1002
1003	750472.322	2080805.699	6042.51	1003
1004	749804.401	2082906.783	6009.90	1004
1005	751476.409	2082101.988	6011.02	1005
1006	753129.724	2083176.162	5985.60	1006
1007	750092.726	2084789.977	5976.88	1007
1008	747433.265	2085548.953	5851.99	1008
1009	753261.473	2089685.075	5764.37	1009
1010	751513.72	2087876.39	5916.45	1010
1011	746982.433	2087918.684	5904.75	1011
1015	757307.563	2113118.464	5557.78	JEFFCO RESET

NAD27 Site Closure Datum - Adjusted				
POINT NUMBER	**NORTHING**	**EASTING**	**ELEVATION**	**DESCRIPTION**
1001	747366.9547	2079494.042	6032.73	1001
1002	749374.2537	2079978.973	6061.35	1002
1003	750471.8167	2080805.357	6039.21	1003 (RF-200)
1004	749803.8957	2082906.441	6006.60	1004
1005	751475.9037	2082101.646	6007.71	1005 (RF-201)
1006	753129.2187	2083175.82	5982.30	1006
1007	750092.2207	2084789.635	5973.58	1007
1008	747432.7597	2085548.611	5848.69	1008
1009	753260.9677	2089684.733	5761.07	1009
1010	751513.2147	2087876.048	5913.15	1010
1011	746981.9277	2087918.342	5901.45	1011

IX. The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

```
DATABASE = Sybase ,PROGRAM = datasheet, VERSION = 7.28
1       National Geodetic Survey,   Retrieval Date = SEPTEMBER 28, 2005
KK0655 ***********************************************************************
KK0655  DESIGNATION - TT 23 J
KK0655  PID         - KK0655
KK0655  STATE/COUNTY- CO/BOULDER
KK0655  USGS QUAD   - LOUISVILLE (1994)
KK0655
KK0655                  *CURRENT SURVEY CONTROL
KK0655 ______________________________________________________________________
KK0655* NAD 83(1992)-  39 55 40.61368(N)    105 13 59.89777(W)    ADJUSTED
KK0655* NAVD 88     -     1798.925  (meters)    5901.97   (feet)  ADJUSTED
KK0655 ______________________________________________________________________
KK0655  X         - -1,287,268.742 (meters)              COMP
KK0655  Y         - -4,727,074.383 (meters)              COMP
KK0655  Z         -  4,072,998.249 (meters)              COMP
KK0655  LAPLACE CORR-       -18.74  (seconds)              DEFLEC99
KK0655  ELLIP HEIGHT-      1783.06  (meters)       (12/03/02) GPS OBS
KK0655  GEOID HEIGHT-       -15.83  (meters)              GEOID03
KK0655  DYNAMIC HT -       1797.140 (meters)    5896.12  (feet)  COMP
KK0655  MODELED GRAV-       979,570.8  (mgal)               NAVD 88
KK0655
KK0655  HORZ ORDER  - FIRST
KK0655  VERT ORDER  - FIRST     CLASS II
KK0655  ELLP ORDER  - FOURTH    CLASS II
KK0655
KK0655.The horizontal coordinates were established by GPS observations
KK0655.and adjusted by the National Geodetic Survey in February 2000.
KK0655
KK0655.The orthometric height was determined by differential leveling
KK0655.and adjusted by the National Geodetic Survey in June 1991.
KK0655
KK0655.The X, Y, and Z were computed from the position and the ellipsoidal ht.
KK0655
KK0655.The Laplace correction was computed from DEFLEC99 derived deflections.
KK0655
KK0655.The ellipsoidal height was determined by GPS observations
KK0655.and is referenced to NAD 83.
KK0655
KK0655.The geoid height was determined by GEOID03.
KK0655
KK0655.The dynamic height is computed by dividing the NAVD 88
KK0655.geopotential number by the normal gravity value computed on the
KK0655.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
KK0655.degrees latitude (g = 980.6199 gals.).
KK0655
KK0655.The modeled gravity was interpolated from observed gravity values.
KK0655
KK0655;              North        East     Units Scale Factor Converg.
KK0655;SPC CO N   -  370,854.808  937,199.209  MT 0.99997263  +0 10 20.4
KK0655;SPC CO N   - 1,216,712.82  3,074,794.40  sFT 0.99997263  +0 10 20.4
KK0655;SPC CO C   -  537,363.710  937,200.748  MT 1.00004006  +0 10 05.5
KK0655;SPC CO C   - 1,763,000.77  3,074,799.45  sFT 1.00004006  +0 10 05.5
KK0655;UTM 13     - 4,419,786.279  480,064.235  MT 0.99960489  -0 08 59.1
```

```
KK0655
KK0655!         - Elev Factor x Scale Factor =  Combined Factor
KK0655!SPC CO N   - 0.99972035 x 0.99997263 =  0.99969299
KK0655!SPC CO C   - 0.99972035 x 1.00004006 =  0.99976040
KK0655!UTM 13     - 0.99972035 x 0.99960489 =  0.99932535
KK0655
KK0655:            Primary Azimuth Mark              Grid Az
KK0655:SPC CO N   - TT 23 J AZ MK                    117 17 55.5
KK0655:SPC CO C   - TT 23 J AZ MK                    117 18 10.4
KK0655:UTM 13     - TT 23 J AZ MK                    117 37 15.0
KK0655
KK0655|-----------------------------------------------------------|
KK0655| PID    Reference Object                Distance     Geod. Az |
KK0655|                                        dddmmss.s |
KK0655| KK2131 TT 23 J RM 1                    12.614 METERS 02514    |
KK0655| KK2132 TT 23 J RM 2                    10.013 METERS 09807    |
KK0655| KK1806 TT 23 J AZ MK OFFSET            453.183 METERS 1172819.7 |
KK0655| KK1805 TT 23 J AZ MK                   458.113 METERS 1172815.9 |
KK0655| KK2055 ELDORADO SPRINGS KBCO MAST      APPROX. 5.4 KM 2521519.7 |
KK0655|-----------------------------------------------------------|
KK0655
KK0655                  SUPERSEDED SURVEY CONTROL
KK0655
KK0655  ELLIP H (02/17/00) 1783.09  (m)              GP(     ) 4 2
KK0655  NAD 83(1992)- 39 55 40.60746(N)  105 13 59.89730(W) AD(     ) 1
KK0655  ELLIP H (01/07/93) 1783.05  (m)              GP(     ) 4 2
KK0655  NAD 83(1986)- 39 55 40.59972(N)  105 13 59.89043(W) AD(     ) 1
KK0655  NAD 27     - 39 55 40.65336(N)  105 13 57.94760(W) AD(     ) 1
KK0655  NAVD 88 (02/17/00) 1798.92  (m)      5902.0   (f) LEVELING   3
KK0655  NGVD 29 (??/??/??) 1797.943  (m)     5898.75  (f) ADJUSTED   1 2
KK0655
KK0655.Superseded values are not recommended for survey control.
KK0655.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
KK0655.See file dsdata.txt to determine how the superseded data were derived.
KK0655
KK0655_U.S. NATIONAL GRID SPATIAL ADDRESS: 13SDE8006419786(NAD 83)
KK0655_MARKER: DB = BENCH MARK DISK
KK0655_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
KK0655_SP_SET: TOP OF SQUARE CONCRETE MONUMENT
KK0655_STAMPING: TT 23 J
KK0655_MARK LOGO: USGS
KK0655_PROJECTION: PROJECTING 6 CENTIMETERS
KK0655_MAGNETIC: O = OTHER; SEE DESCRIPTION
KK0655_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
KK0655+STABILITY: SURFACE MOTION
KK0655_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
KK0655+SATELLITE: SATELLITE OBSERVATIONS - November 17, 1998
KK0655
KK0655 HISTORY   - Date    Condition      Report By
KK0655 HISTORY   - 1936    MONUMENTED     USGS
KK0655 HISTORY   - 1952    GOOD           NGS
KK0655 HISTORY   - 1977    GOOD           NGS
KK0655 HISTORY   - 1982    GOOD           NGS
KK0655 HISTORY   - 1984    GOOD           NGS
KK0655 HISTORY   - 1986    GOOD           NGS
KK0655 HISTORY   - 1986    GOOD           NGS
KK0655 HISTORY   - 19981117 GOOD          NGS
KK0655
KK0655                  STATION DESCRIPTION
KK0655
KK0655'DESCRIBED BY NATIONAL GEODETIC SURVEY 1952
```

KK0655'6.6 MI S FROM BOULDER.
KK0655'6.65 MILES SOUTH ALONG STATE HIGHWAY 93 FROM THE UNIVERSITY
KK0655'INTERMEDIATE SCHOOL AT BOULDER, 30 FEET EAST OF THE CENTER LINE
KK0655'OF THE HIGHWAY, 1 FOOT WEST OF A FENCE, 3 FEET NORTH OF A WITNESS
KK0655'POST, SET IN THE TOP OF A CONCRETE POST WHICH PROJECTS 0.6 FOOT
KK0655'ABOVE THE GROUND.
KK0655
KK0655 STATION RECOVERY (1977)
KK0655
KK0655'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1977 (LHW)
KK0655'STATION IS ABOUT 12 MILES NORTH OF GOLDEN, 6-3/4 MILES SOUTH-
KK0655'SOUTHEAST OF BOULDER, 3/4 MILE NORTH OF THE BOULDER-JEFFERSON
KK0655'COUNTY LINE, ON STATE HIGHWAY RIGHT-OF-WAY, IN THE NORTH
KK0655'CENTRAL 1/2 OF SEC 32, T 1 S, R 70 W.
KK0655'
KK0655'TO REACH THE STATION FROM THE JUNCTION OF STATE HIGHWAYS
KK0655'93 AND 128, ABOUT 7 MILES SOUTH OF BOULDER, GO EAST ON HIGH-
KK0655'WAY 128 FOR 0.1 MILE TO THE STATION ON THE RIGHT. TO REACH
KK0655'THE AZIMUTH MARK FROM THE STATION, GO EAST AND SOUTHEAST
KK0655'ON HIGHWAY 128 FOR 0.3 MILE TO A CUTBANK ON THE LEFT AND THE
KK0655'MARK ON THE LEFT ATOP THE CUTBANK AND NEAR THE NORTH
KK0655'RIGHT-OF-WAY FENCE.
KK0655'
KK0655'STATION MARK, STAMPED---TT 23 J 1936---, IS A BRONZE BENCH
KK0655'MARK DISK OF THE U.S. GEOLOGICAL SURVEY, SET IN THE TOP OF
KK0655'AN 8-INCH SQUARE CONCRETE MONUMENT THAT PROJECTS 5 INCHES.
KK0655'IT IS 106 FEET SOUTH OF THE CENTER OF HIGHWAY 128, 19 FEET
KK0655'NORTH OF THE SOUTH RIGHT-OF-WAY FENCE AND 2 FEET NORTH OF A
KK0655'METAL WITNESS POST AND 4 INCH BY 4 INCH WOODEN POST.
KK0655'
KK0655'REFERENCE MARK 1, STAMPED---TT 23 J USGS NO 1 1977---, IS A
KK0655'STANDARD DISK CEMENTED IN A DRILL HOLE IN A TRIANGULAR
KK0655'SHAPED BOULDER THAT PROJECTS 2 INCHES. IT IS 65 FEET
KK0655'SOUTH OF THE CENTER OF THE HIGHWAY AND 55.5 FEET NORTH OF
KK0655'THE RIGHT-OF-WAY FENCE.
KK0655'
KK0655'REFERENCE MARK 2, STAMPED---TT 23 J USGS NO 2 1977---, IS A
KK0655'STANDARD DISK CEMENTED IN A DRILL HOLE IN A 12-INCH ROUND
KK0655'BOULDER THAT PROJECTS 1 INCH. IT IS 33 FEET EAST OF THE
KK0655'WITNESS POST AND 14 FEET NORTH OF THE FENCE.
KK0655'
KK0655'AZIMUTH MARK, STAMPED---TT 23 J USGS 1977---, IS A STANDARD
KK0655'DISK CEMENTED IN A DRILL HOLE IN A 12-INCH ROUND BOULDER
KK0655'THAT PROJECTS 4 INCHES. IT IS 4 FEET NORTHWEST OF A METAL
KK0655'WITNESS POST AND 3.5 FEET SOUTHWEST OF THE RIGHT-OF-WAY
KK0655'FENCE.
KK0655'
KK0655'HEIGHT OF LIGHT ABOVE STATION WAS 1.4 METERS.
KK0655
KK0655 STATION RECOVERY (1982)
KK0655
KK0655'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1982
KK0655'0.2 KM (0.1 MI) EAST OF STATE HIGHWAY 93, 32.3 M (106 FT) SOUTH OF
KK0655'THE CENTERLINE OF THE SOUTH LANE OF COLORADO STATE HIGHWAY 128, AND
KK0655'5.5 M (18 FT) NORTH OF AN EAST-WEST RIGHT OF WAY FENCE.
KK0655
KK0655 STATION RECOVERY (1984)
KK0655
KK0655'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1984
KK0655'RECOVERED IN GOOD CONDITION. A NEW DESCRIPTION FOLLOWS. 4.0 KM
KK0655'(2.5 MI) SOUTH ALONG U.S. HIGHWAY 36 FROM ITS NORTH JUNCTION WITH

KK0655'STATE HIGHWAY 119 IN BOULDER, THENCE 0.4 KM (0.25 MI) WEST ALONG
KK0655'BASELINE ROAD, THENCE 9.0 KM (5.6 MI) SOUTHERLY ALONG STATE HIGHWAY
KK0655'93, 115.0 METERS (377.3 FT) EAST OF THE CENTERLINE OF THE HIGHWAY,
KK0655'32.3 METERS (106.O FT) SOUTH OF THE CENTERLINE OF THE SOUTHEAST BOUND
KK0655'LANES OF STATE HIGHWAY 128, AND 5.4 METERS (17.7 FT) NORTH OF A FENCE.
KK0655'THE MARK IS 0.7 METERS N FROM A WITNESS POST.
KK0655'THE MARK IS ABOVE LEVEL WITH THE HIGHWAY.
KK0655
KK0655 STATION RECOVERY (1986)
KK0655
KK0655'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1986 (RSC)
KK0655'THE STATION WAS RECOVERED AT THIS DATE.
KK0655'RECOVERED IN GOOD CONDITION AND AS DESCRIBED.
KK0655'
KK0655'DESCRIBED BY R.S. COHEN.
KK0655
KK0655 STATION RECOVERY (1986)
KK0655
KK0655'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1986 (MCG)
KK0655'THE DESIGNATED MARK WAS RECOVERED AS PREVIOUSLY DESCRIBED.
KK0655'THE MARK WAS RECOVERED IN GOOD CONDITION.
KK0655
KK0655 STATION RECOVERY (1998)
KK0655
KK0655'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1998 (RSC)
KK0655'RECOVERED IN GOOD CONDITION AND AS DESCRIBED WITH THE FOLLOWING
KK0655'ADDITION. AT STATE HIGHWAY 128 MILEPOST 0.1.

*** retrieval complete.
Elapsed Time = 00:00:02

X. The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

```
DATABASE = Sybase ,PROGRAM = datasheet, VERSION = 7.28
1       National Geodetic Survey,   Retrieval Date = SEPTEMBER 28, 2005
KK1432 ***********************************************************************
KK1432  DESIGNATION - JEFFCO RESET
KK1432  PID         - KK1432
KK1432  STATE/COUNTY- CO/JEFFERSON
KK1432  USGS QUAD   - LAFAYETTE (1994)
KK1432
KK1432                  *CURRENT SURVEY CONTROL
KK1432 ______________________________________________________________________
KK1432* NAD 83(1992)-  39 54 43.05405(N)    105 05 50.35674(W)    ADJUSTED
KK1432* NAVD 88     -     1694.016  (meters)    5557.78   (feet)  ADJUSTED
KK1432 ______________________________________________________________________
KK1432  X         - -1,276,321.740 (meters)                COMP
KK1432  Y         - -4,731,138.095 (meters)                COMP
KK1432  Z         -  4,071,568.452 (meters)                COMP
KK1432  LAPLACE CORR-        -11.98  (seconds)              DEFLEC99
KK1432  ELLIP HEIGHT-       1677.27  (meters)        (10/21/02) GPS OBS
KK1432  GEOID HEIGHT-        -16.78  (meters)              GEOID03
KK1432  DYNAMIC HT -        1692.394 (meters)    5552.46  (feet)  COMP
KK1432  MODELED GRAV-        979,608.9  (mgal)                NAVD 88
KK1432
KK1432  HORZ ORDER  - FIRST
KK1432  VERT ORDER  - FIRST     CLASS II
KK1432  ELLP ORDER  - FIFTH     CLASS I
KK1432
KK1432.The horizontal coordinates were established by GPS observations
KK1432.and adjusted by the National Geodetic Survey in May 1996.
KK1432
KK1432.The orthometric height was determined by differential leveling
KK1432.and adjusted by the National Geodetic Survey in June 1991.
KK1432.WARNING-GPS observations at this control monument resulted in a GPS
KK1432.derived orthometric height which differed from the leveled height by
KK1432.more than one decimeter (0.1 meter).
KK1432
KK1432.The X, Y, and Z were computed from the position and the ellipsoidal ht.
KK1432
KK1432.The Laplace correction was computed from DEFLEC99 derived deflections.
KK1432
KK1432.The ellipsoidal height was determined by GPS observations
```

KK1432.and is referenced to NAD 83.
KK1432
KK1432.The geoid height was determined by GEOID03.
KK1432
KK1432.The dynamic height is computed by dividing the NAVD 88
KK1432.geopotential number by the normal gravity value computed on the
KK1432.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
KK1432.degrees latitude (g = 980.6199 gals.).
KK1432
KK1432.The modeled gravity was interpolated from observed gravity values.
KK1432
KK1432; North East Units Scale Factor Converg.
KK1432;SPC CO C - 535,631.202 948,833.364 MT 1.00003606 +0 15 14.3
KK1432;SPC CO C - 1,757,316.70 3,112,964.13 sFT 1.00003606 +0 15 14.3
KK1432;SPC CO N - 369,123.462 948,831.230 MT 0.99997423 +0 15 36.7
KK1432;SPC CO N - 1,211,032.56 3,112,957.13 sFT 0.99997423 +0 15 36.7
KK1432;UTM 13 - 4,417,990.187 491,682.022 MT 0.99960085 -0 03 44.8
KK1432
KK1432! - Elev Factor x Scale Factor = Combined Factor
KK1432!SPC CO C - 0.99973694 x 1.00003606 = 0.99977299
KK1432!SPC CO N - 0.99973694 x 0.99997423 = 0.99971118
KK1432!UTM 13 - 0.99973694 x 0.99960085 = 0.99933789
KK1432
KK1432: Primary Azimuth Mark Grid Az
KK1432:SPC CO C - JEFFCO AZ MK 172 17 12.5
KK1432:SPC CO N - JEFFCO AZ MK 172 16 50.1
KK1432:UTM 13 - JEFFCO AZ MK 172 36 11.6
KK1432
KK1432|---|
KK1432| PID Reference Object Distance Geod. Az |
KK1432| dddmmss.s |
KK1432| KK2051 BROOMFIELD GREEN TANK **APPROX. 3.8 KM 0273815**.4 |
KK1432| KK1745 NORTHGLENN MUN TANK APPROX. 8.2 KM 1140841.6 |
KK1432| KK1433 JEFFCO AZ MK APPROX. 1.1 KM 1723226.8 |
KK1432| CP8324 JEFFCO RM 2 10.748 METERS 17414 |
KK1432| CP8323 JEFFCO RM 1 10.279 METERS 35356 |
KK1432| LL1409 ERIE ALEXANDER DAWSON SCH TANK **APPROX.16**.9 KM 3564737.8 |
KK1432|---|
KK1432
KK1432 SUPERSEDED SURVEY CONTROL
KK1432
KK1432 ELLIP H (05/15/96) 1677.29 (m) GP( ) 3 1
KK1432 NAD 83(1992)- 39 54 43.05416(N) **105 05 50.36276(W)** AD( ) 1
KK1432 NAD 83(1986)- 39 54 43.04308(N) 105 05 50.35714(W) AD( ) 1
KK1432 NAVD 88 (05/15/96) 1694.02 (m) 5557.8 (f) LEVELING 3
KK1432 NGVD 29 (??/??/??) 1693.087 (m) 5554.74 (f) ADJUSTED 1 2
KK1432
KK1432.Superseded values are not recommended for survey control.
KK1432.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
KK1432.See file dsdata.txt to determine how the superseded data were derived.
KK1432
KK1432_U.S. NATIONAL GRID SPATIAL ADDRESS: 13SDE9168217990(NAD 83)
KK1432_MARKER: DH = HORIZONTAL CONTROL DISK
KK1432_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
KK1432_SP_SET: CONCRETE POST
KK1432_STAMPING: JEFFCO 1977 1980
KK1432_MARK LOGO: NGS
KK1432_PROJECTION: FLUSH
KK1432_MAGNETIC: O = OTHER; SEE DESCRIPTION
KK1432_STABILITY: D = MARK OF QUESTIONABLE OR UNKNOWN STABILITY
KK1432_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR

KK1432+SATELLITE: SATELLITE OBSERVATIONS - April 06, 1999
KK1432
KK1432 HISTORY - Date Condition Report By
KK1432 HISTORY - 1980 MONUMENTED NGS
KK1432 HISTORY - 1981 GOOD NGS
KK1432 HISTORY - 19811209 GOOD NGS
KK1432 HISTORY - 1984 GOOD NGS
KK1432 HISTORY - 1986 GOOD NGS
KK1432 HISTORY - 19951202 GOOD CHANCE
KK1432 HISTORY - 19990223 GOOD NGS
KK1432 HISTORY - 19990406 GOOD NGS
KK1432
KK1432 STATION DESCRIPTION
KK1432
KK1432'DESCRIBED BY NATIONAL GEODETIC SURVEY 1980 (CLN)
KK1432'STATION WAS RECOVERED AND OCCUPIED IN 1979, ALL MARKS WERE IN GOOD
KK1432'CONDITION. AT TIME OF PRESENT RECOVERY, STATION MARK AND BOTH
KK1432'REFERENCE MARKS WERE NOTED TO BE COVERED BY FILL DIRT. STATION MARK
KK1432'WAS FOUND, A 12 INCH METAL PIPE, 3.7 FEET IN HEIGHT WAS PLACED OVER
KK1432'THE ORIGINAL SURFACE MARK AND MARK RAISED TO SURFACE OF GROUND. AN
KK1432'8 INCH PIPE WAS PLACED OVER REFERENCE MARK NUMBER 2 AND RAISED TO
KK1432'GROUND SURFACE. REFERENCE MARK NUMBER 1 WAS NOT SEARCHED FOR BUT IS
KK1432'PROBABLY STILL IN ITS ORIGINAL LOCATION UNDER ABOUT 4 FEET OF FILL
KK1432'DIRT. AZIMUTH MARK IS IN GOOD CONDITION. A NEW REFERENCE MARK,
KK1432'NUMBER 3 WAS ESTABLISHED AT THIS TIME. DISTANCE AND DIRECTION TO
KK1432'REFERENCE MARK 2 AND THE HORIZONTAL ANGLE BETWEEN THE NORTH GLENN
KK1432'TANK AND THE AZIMUTH MARK COMPARED FAVORABLY WITH PREVIOUS DATA. A
KK1432'NEW JEFFERSON COUNTY AIRPORT TERMINAL BUILDING IS BEING CONSTRUCTED
KK1432'ABOUT 0.05 MILES WEST OF THE STATION.
KK1432'
KK1432'STATION MARKS ARE STANDARD DISKS. ORIGINAL SURFACE AND SUBSURFACE
KK1432'DISKS ARE STAMPED--JEFFCO 1977--AND THE SURFACE DISK IS NOW ABOUT
KK1432'3.7 FEET DEEP. PRESENT SURFACE DISK IS STAMPED--JEFFCO 1977 1980--,
KK1432'SET IN THE TOP OF A 12 INCH ROUND CONCRETE FILLED METAL PIPE FLUSH
KK1432'WITH THE GROUND, 117 FEET WEST OF CENTER STATE HIGHWAY 121, 2.8 FEET
KK1432'EAST OF A CONCRETE CURB, 2.2 FEET SOUTH OF A METAL WITNESS POST.
KK1432'
KK1432'REFERENCE MARK 2 SUBSURFACE DISK IS STAMPED--JEFFCO NO 2 1977--AND
KK1432'IS ABOUT 3 FEET DEEP. PRESENT SURFACE DISK IS STAMPED--JEFFCO 1977
KK1432'NO 2 1980--, SET IN THE TOP OF AN 8 INCH ROUND METAL PIPE FLUSH WITH
KK1432'THE GROUND, 117 FEET WEST OF CENTER HIGHWAY 121 SOUTHBOUND LANE.
KK1432'
KK1432'REFERENCE MARK 3 IS A STANDARD DISK, STAMPED--JEFFCO 1977 NO 2
KK1432'1980--, SET IN THE TOP OF A ROUND CONCRETE MONUMENT FLUSH WITH THE
KK1432'GROUND, 77 FEET WEST OF CENTER HIGHWAY 121 SOUTHBOUND LANE, 1.8 FEET
KK1432'EAST OF EAST EDGE OF A CONCRETE WALK AND ABOUT 5 FEET LOWER THAN
KK1432'STATION MARK.
KK1432'
KK1432'AZIMUTH MARK IS A STANDARD DISK, STAMPED--JEFFCO 1977--, SET IN
KK1432'THE TOP OF A ROUND CONCRETE MONUMENT FLUSH WITH THE GROUND, 119 FEET
KK1432'EAST OF CENTER HIGHWAY 121 NORTHBOUND LANE, 3 FEET NORTHWEST OF A
KK1432'METAL WITNESS POST, 1.3 FEET WEST OF A FENCE.
KK1432'
KK1432'DESCRIPTION OF HOW TO REACH STATION IS STILL ADEQUATE.
KK1432
KK1432 STATION RECOVERY (1981)
KK1432
KK1432'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1981 (RMM)
KK1432'THE STATION MARK (STAMPED JEFFCO 1977 1980), RM 2 (STAMPED JEFFCO NO
KK1432'2 1977 1980), AND THE AZIMUTH MARK (STAMPED JEFFCO 1977) WERE
KK1432'RECOVERED IN GOOD CONDITION. NO DESCRIPTION AVAILABLE.

KK1432'
KK1432'AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN--1 MILE SOUTHWEST OF
KK1432'BROOMFIELD.
KK1432
KK1432 **STATION RECOVERY (1981)**
KK1432
KK1432'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1981 (CLN)
KK1432'THE STATION MARK, REFERENCE MARK 3 AND THE AZIMUTH MARK WERE RECOVERED
KK1432'IN GOOD CONDITION. REFERENCE MARK 2 SET IN 1980 WAS FOUND LOOSE IN
KK1432'THE GROUND TO SUCH AN EXTENT THAT IT WAS DESTROYED. THE ORIGINAL
KK1432'REFERENCE MARKS 1 AND 2 ARE BURIED UNDER FILL DIRT. TWO NEW REFERENCE
KK1432'MARKS WERE SET AT THIS TIME AND NUMBERED 4 AND 5. A CHECK WAS MADE OF
KK1432'THE DISTANCE TO THE AZIMUTH MARK FROM THE STATION MARK AT THE REQUEST
KK1432'OF THE JEFFERSON COUNTY MAPPING GROUP AND A 100 METER (328.1 FT) BUST
KK1432'WAS FOUND AS MY DISTANCE CHECKED THEIRS. THE DISTANCE AND DIRECTIONS
KK1432'CHECKED WITHIN LIMITS WITH THE 1977 AND 1980 OBSERVATIONS. THE
KK1432'LOCATION AND TO REACH ARE ADEQUATE TO RECOVER THE STATION. A NEW
KK1432'BUILDING TO THE WEST OF THE STATION ABOUT 0.1 KM (0.05 MI) AND WHOSE
KK1432'LAND REFERENCE MARKS 4 AND 5 ARE LOCATED ON, BELONGS TO, ROCKY
KK1432'MOUNTAIN ENERGY, 10 LONGS PEAK DRIVE, P.O. BOX 2000, BROOMFIELD, CO.
KK1432'80020.
KK1432'REFERENCE MARK NO 4 IS A STANDARD NGS DISK STAMPED--JEFFCO 1977 NO 4
KK1432'1981--, SET INTO THE TOP OF A CURB ON THE EASTSIDE OF A SHORT DEAD END
KK1432'STREET. LOCATED 3.5 METERS (11.5 FT) EAST FROM THE CENTER OF A PAVED
KK1432'DEADEND STREET WEST OF STATION. 6.1 METERS (20.0 FT) NORTH FROM A
KK1432'METAL WITNESS POST WITH SIGN. 7.5 METERS (24.6 FT) NORTH FROM THE END
KK1432'OF THE STREET AND 1.0 FEET (0.3 M) HIGHER THAN THE STATION.
KK1432'REFERENCE MARK NO 5 IS A STANDARD NGS DISK STAMPED--JEFFCO 1977 NO 5
KK1432'1981--, SET INTO THE WESTSIDE OF A CONCRETE CURB OF A SHORT DEADEND
KK1432'STREET. LOCATED 7.9 METERS (25.9 FT) WEST FROM A METAL WITNESS POST
KK1432'AND SIGN. 3.5 WEST FROM THE CENTER OF A DEADEND STREET WEST OF THE
KK1432'STATION. 3.4 METERS (11.2 FT) NORTH FROM THE END OF THE STREET AND
KK1432'1.0 FEET (0.3 M) HIGHER THAN THE STATION.
KK1432'
KK1432
KK1432 STATION RECOVERY (1984)
KK1432
KK1432'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1984
KK1432'1.1 KM (0.7 MI) SOUTH FROM BROOMFIELD.
KK1432'1.1 KM (0.7 MI) SOUTHERLY ALONG STATE HIGHWAY 121 FROM ITS JUNCTION
KK1432'WITH U.S. HIGHWAY 287 IN BROOMFIELD, 0.4 KM (0.25 MI) NORTH OF THE
KK1432'ENTRANCE TO THE JEFFCO AIRPORT, 99.0 METERS (324.8 FT) EAST OF THE
KK1432'EAST FACE OF A STUCCO BUILDING, 28.5 METERS (93.5 FT) WEST OF THE
KK1432'CENTERLINE OF THE SOUTH BOUND LANES OF THE HIGHWAY, AND 0.3 METERS
KK1432'(1.0 FT) EAST OF A FENCE.
KK1432'THE MARK IS 0.6 METERS S FROM A WITNESS POST.
KK1432'THE MARK IS 5.0 M ABOVE THE HIGHWAY.
KK1432
KK1432 STATION RECOVERY (1986)
KK1432
KK1432'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1986 (MCG)
KK1432'THE DESIGNATED MARK WAS RECOVERED AS PREVIOUSLY DESCRIBED.
KK1432'THE MARK WAS RECOVERED IN GOOD CONDITION.
KK1432
KK1432 STATION RECOVERY (1995)
KK1432
KK1432'RECOVERY NOTE BY JE CHANCE AND ASSOCIATES 1995 (FND)
KK1432'STATION AND REFERENCE MARKS NO. 4 AND NO. 5 WERE RECOVERED IN GOOD
KK1432'CONDITION AS DESCRIBED. A NEW DESCRIPTION FOLLOWS$THE STATION IS
KK1432'LOCATED IN THE SOUTHERLY PART OF THE CITY OF BROOMFIELD, ABOUT 1 MI
KK1432'(1.6 KM) EAST OF JEFFERSON COUNTY AIRPORT, 3.5 MI (5.6 KM)

KK1432'NORTH-NORTHEAST OF STANLEY LAKE, 5 MI (8.0 KM) SOUTH-SOUTHEAST OF
KK1432'LOUISVILLE, 6 MI (9.7 KM) EAST-NORTHEAST OF THE ROCKY FLATS
KK1432'ENVIRONMENTAL TECHNOLOGY SITE, IN THE NORTHEAST 1/4 OF SECTION 3, T 2
KK1432'S, R 69 W, 6TH P.M. OWNERSHIP--COLORADO DEPARTMENT OF
KK1432'TRANSPORTATION$TO REACH THE STATION FROM THE INTERSECTION OF U.S.
KK1432'HIGHWAY 36 AND WADSWORTH BYPASS (STATE HIGHWAY 121) , GO SOUTHWEST
KK1432'ALONG WADSWORTH BYPASS (HIGHWAY 121) FOR 0.2 MI (0.3 KM) T0 THE
KK1432'INTERSECTION WITH STATE HIGHWAY 128 ON THE RIGHT. CONTINUE AHEAD AND
KK1432'GO SOUTH ALONG WADSWORTH BYPASS (HIGHWAY 121) FOR 0.15 MI (0.24 KM) TO
KK1432'THE STATION ON THE RIGHT. FOR CLOSER ACCESS, CONTINUE AHEAD AND GO
KK1432'SOUTH ALONG WADSWORTH BYPASS (HIGHWAY 121) FOR 0.2 MI (0.3 KM) TO THE
KK1432'INTERSECTION WITH JEFFCO AIRPORT AVENUE ON THE RIGHT. TURN RIGHT AND
KK1432'GO WEST ALONG JEFFCO AIRPORT AVENUE FOR 0.1 MI (0.2 KM) TO THE
KK1432'INTERSECTION WITH LONGS PEAK DRIVE ON THE RIGHT. TURN RIGHT AND GO
KK1432'NORTH, NORTHWEST, AND NORTH ALONG LONGS PEAK DRIVE FOR 0.4 MI (0.6 KM)
KK1432'TO THE ENTRANCE TO BALL CORPORATION COLORADO ENGINEERING CENTER ON THE
KK1432'RIGHT. TURN RIGHT AND GO EAST ALONG THE DRIVEWAY FOR 0.1 MI (0.2 KM)
KK1432'TO AN INTERSECTION WITH A DRIVEWAY ON THE RIGHT AT A SIGN FOR SHIPPING
KK1432'AND RECEIVING AND THE WEST SIDE OF A PARKING LOT. TURN RIGHT AND GO
KK1432'SOUTH ALONG THE DRIVEWAY FOR 0.05 MI (0.08 KM) TO AN ANGLE POINT LEFT.
KK1432'TURN LEFT AND GO EAST ALONG THE DRIVEWAY, PASSING ALONG THE NORTH SIDE
KK1432'OF THE BUILDING, FOR 0.15 MI (0.24 KM) TO AN INTERSECTION WITH A
KK1432'NORTH-SOUTH DRIVE NEAR THE RIGHT-OF-WAY FENCE OF WADSWORTH BYPASS.
KK1432'TURN RIGHT AND GO SOUTH ALONG THE DRIVE AND ALONG THE RIGHT-OF-WAY
KK1432'FENCE FOR 0.03 MI (0.05 KM) TO THE END OF THE DRIVE AND THE STATION ON
KK1432'THE LEFT$THE STATION MARK IS A STANDARD NGS HORIZONTAL CONTROL MARK
KK1432'DISK STAMPED --JEFFCO 1977 1980-- SET IN THE TOP OF A CONCRETE POST
KK1432'0.2 FT (6.1 CM) BELOW GROUND LEVEL. IT IS 118 FT (36.0 M) WEST OF THE
KK1432'CENTERLINE OF THE SOUTH-BOUND LANES OF WADSWORTH BYPASS, 15 FT (4.6 M)
KK1432'EAST OF THE CENTERLINE OF THE DRIVEWAY, 1.7 FT (0.5 M) EAST OF THE
KK1432'RIGHT-OF-WAY FENCE, 2.4 FT (0.7 M) NORTH OF THE BACK OF THE CONCRETE
KK1432'CURB (PROJECTED EAST) AT THE SOUTH END OF THE DRIVEWAY, 29.9 FT (9.1
KK1432'M) WEST OF THE WEST EDGE OF AN 8 FOOT (2.4 M) WIDE CONCRETE SIDEWALK,
KK1432'2.3 FT (0.7 M) SOUTH OF A METAL WITNESS POST WITH SIGN, AND 3.9 FT
KK1432'(1.2 M) NORTH OF A CARSONITE WITNESS POST$DESCRIBED BY F.N. DREXEL
KK1432
KK1432 **STATION RECOVERY (1999)**
KK1432
KK1432'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1999 (RSC)
KK1432'RECOVERED AS DESCRIBED.
KK1432
KK1432 STATION RECOVERY (1999)
KK1432
KK1432'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1999 (RSC)
KK1432'THE MARK WAS RECOVERED IN GOOD CONDITION AND THE 1995 DESCRIPTION IS
KK1432'GOOD. ADD- AT STATE HIGHWAY 121 MILEPOST 25.6. ABOUT 6 M (19.7 FT)
KK1432'ABOVE THE HIGHWAY.

*** retrieval complete.
Elapsed Time = 00:00:01

Recompute Report

Project : FLATS-CONTROL-NET-NAD-83

User name	Jjung	**Date & Time**	8:26:17 AM 9/14/2005
Coordinate System	US State Plane 1983	**Zone**	Colorado Central 0502
Project Datum	NAD 1983 (Conus)		

Vertical Datum		**Geoid Model**	GEOID99 (Conus)
Coordinate Units	US survey feet		
Distance Units	US survey feet		
Height Units	US survey feet		

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Closures

Closures have been detected for the following points

1015

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Point Derivations

Observations or coordinates in red are out of tolerance. They have not been used to determine the coordinate of the point.

Resultant coordinates for point : 1004

Northing	Easting	Elevation	Height
1749813.812sft	3082752.088sft	6009.910sft	5957.478sft

ID	Used to calc.	Status	Δ North	Δ East	Distance (Horiz)	Δ Elevation	Δ Height
CW298 Adjustment	NEeh	Enabled	0.000sft	0.000sft	0.000sft	0.000sft	0.000sft

Resultant coordinates for point : 1003

Northing	Easting	Elevation	Height
1750481.766sft	3080650.994sft	6042.522sft	5990.281sft

ID	Used to calc.	Status	Δ North	Δ East	Distance (Horiz)	Δ Elevation	Δ Height
CW297 Adjustment	NEeh	Enabled	0.000sft	0.000sft	0.000sft	0.000sft	0.000sft

Resultant coordinates for point : 1001

Northing	Easting	Elevation	Height
1747376.894sft	3079339.642sft	6036.045sft	5983.999sft

ID	Used to calc.	Status	Δ North	Δ East	Distance (Horiz)	Δ Elevation	Δ Height
CW300 Adjustment	NEeh	Enabled	0.000sft	0.000sft	0.000sft	0.000sft	0.000sft

Resultant coordinates for point : 1002

Northing	Easting	Elevation	Height
1749384.205sft	3079824.594sft	6064.662sft	6012.526sft

ID	Used to calc.	Status	Δ North	Δ East	Distance (Horiz)	Δ Elevation	Δ Height
CW299 Adjustment	NEeh	Enabled	0.000sft	0.000sft	0.000sft	0.000sft	0.000sft

Resultant coordinates for point : 1007

Northing	Easting	Elevation	Height
1750102.114sft	3084635.299sft	5976.903sft	5924.288sft

ID	Used to calc.	Status	Δ North	Δ East	Distance (Horiz)	Δ Elevation	Δ Height
CW302 Adjustment	NEeh	Enabled	0.000sft	0.000sft	0.000sft	0.000sft	0.000sft

Resultant coordinates for point : 1008

Northing	Easting	Elevation	Height
1747442.619sft	3085394.257sft	5852.002sft	5799.364sft

ID	Used to calc.	Status	Δ North	Δ East	Distance (Horiz)	Δ Elevation	Δ Height
CW301 Adjustment	NEeh	Enabled	0.000sft	0.000sft	0.000sft	0.000sft	0.000sft

Resultant coordinates for point : 1005

Northing	Easting	Elevation	Height

1751485.845sft	3081947.302sft	6011.036sft	5958.651sft

ID	Used to calc.	Status	Δ North	Δ East	Distance (Horiz)	Δ Elevation	Δ Height
CW303 Adjustment	NEeh	Enabled	0.000sft	0.000sft	0.000sft	0.000sft	0.000sft

Resultant coordinates for point : 1006

Northing	Easting	Elevation	Height
1753139.162sft	3083021.498sft	5985.612sft	5933.094sft

ID	Used to calc.	Status	Δ North	Δ East	Distance (Horiz)	Δ Elevation	Δ Height
CW304 Adjustment	NEeh	Enabled	0.000sft	0.000sft	0.000sft	0.000sft	0.000sft

Resultant coordinates for point : 1010

Northing	Easting	Elevation	Height
1751523.080sft	3087721.749sft	5916.471sft	5863.551sft

ID	Used to calc.	Status	Δ North	Δ East	Distance (Horiz)	Δ Elevation	Δ Height
CW305 Adjustment	NEeh	Enabled	0.000sft	0.000sft	0.000sft	0.000sft	0.000sft

Resultant coordinates for point : 1011

Northing	Easting	Elevation	Height
1746991.753sft	3087764.001sft	5904.771sft	5851.929sft

ID	Used to calc.	Status	Δ North	Δ East	Distance (Horiz)	Δ Elevation	Δ Height
CW306 Adjustment	NEeh	Enabled	0.000sft	0.000sft	0.000sft	0.000sft	0.000sft

Resultant coordinates for point : 1009

Northing	Easting	Elevation	Height
1753270.823sft	3089530.462sft	5764.390sft	5711.280sft

ID	Used to calc.	Status	Δ North	Δ East	Distance (Horiz)	Δ Elevation	Δ Height
CW307 Adjustment	NEeh	Enabled	0.000sft	0.000sft	0.000sft	0.000sft	0.000sft

Resultant coordinates for point : 10

Northing	Easting	Elevation	Height
1763000.772sft	3074799.454sft	5901.808sft	5849.920sft

ID	Used to calc.	Status	Δ North	Δ East	Distance (Horiz)	Δ Elevation	Δ Height
CW55 Office entered	NEeh	Enabled	0.000sft	0.000sft	0.000sft	0.000sft	0.000sft

Resultant coordinates for point : 1015

Northing	Easting	Elevation	Height
1757316.637sft	3112964.082sft	5557.858sft	5502.925sft

ID	Used to calc.	Status	Δ North	Δ East	Distance (Horiz)	Δ Elevation	Δ Height
CW261 Office entered		Enabled	-0.066sft	-0.048sft	0.081sft	0.078sft	0.078sft
CW308 Adjustment	NEeh	Enabled	0.000sft	0.000sft	0.000sft	0.000sft	0.000sft

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Survey Data

Coordinates

ID	Point Name	Source	Latitude	Longitude	Height	Elevation
C298(geod-WGS)	1004	Adjustment	39°53'30.05594"N	105°12'18.37040"W	5957.478sft	?
C297(geod-WGS)	1003	Adjustment	39°53'36.72332"N	105°12'45.29812"W	5990.281sft	?
C300(geod-WGS)	1001	Adjustment	39°53'06.08108"N	105°13'02.24579"W	5983.999sft	?
C299(geod-WGS)	1002	Adjustment	39°53'25.90274"N	105°12'55.94433"W	6012.526sft	?
C302(geod-WGS)	1007	Adjustment	39°53'32.84390"N	105°11'54.19851"W	5924.288sft	?

C301(geod-WGS)	1008	Adjustment	39°53'06.53728"N	105°11'44.57605"W	5799.364sft	?
C303(geod-WGS)	1005	Adjustment	39°53'46.60494"N	105°12'28.62600"W	5958.651sft	?
C304(geod-WGS)	1006	Adjustment	39°54'02.90889"N	105°12'14.77520"W	5933.093sft	?
C305(geod-WGS)	1010	Adjustment	39°53'46.78298"N	105°11'14.53947"W	5863.550sft	?
C306(geod-WGS)	1011	Adjustment	39°53'02.00221"N	105°11'14.19750"W	5851.929sft	?
C307(geod-WGS)	1009	Adjustment	39°54'03.99226"N	105°10'51.25530"W	5711.279sft	?
C55(geod-WGS)	10	Office entered	39°55'40.61368"N	105°13'59.89777"W	5849.920sft	? ?
C261(geod-WGS)	1015	Office entered	39°54'43.05405"N	105°05'50.35674"W	5502.847sft	? ?
C308(geod-WGS)	1015	Adjustment	39°54'43.05340"N	105°05'50.35736"W	5502.925sft	?

ID	Point Name	Source	Quality	Latitude	Longitude	Height
C1(soln)	1004	DAT file (15532380.dat)	?	39°53'30.08027"N	105°12'18.45914"W	5961.287sft
C5(soln)	1004	DAT file (15532380.dat)	?	39°53'30.12236"N	105°12'18.41521"W	5967.693sft
C9(soln)	1004	DAT file (15532380.dat)	?	39°53'30.17185"N	105°12'18.38302"W	5961.122sft
C2(soln)	1003	DAT file (24292380.dat)	?	39°53'36.74904"N	105°12'45.38689"W	5993.703sft
C11(soln)	1003	DAT file (53962381.dat)	?	39°53'36.83988"N	105°12'45.31465"W	5993.615sft
C26(soln)	1003	DAT file (24292370.dat)	?	39°53'36.74274"N	105°12'45.33462"W	5987.672sft
C3(soln)	1001	DAT file (53962380.dat)	?	39°53'06.10428"N	105°13'02.33752"W	5987.618sft
C7(soln)	1001	DAT file (53962380.dat)	?	39°53'06.14291"N	105°13'02.29485"W	5994.522sft
C27(soln)	1001	DAT file (53962370.dat)	?	39°53'06.10419"N	105°13'02.28623"W	5981.732sft
C4(soln)	1002	DAT file (58502381.dat)	?	39°53'25.92726"N	105°12'56.03605"W	6015.257sft
C28(soln)	1002	DAT file (58502370.dat)	?	39°53'25.92545"N	105°12'55.98172"W	6010.187sft
C6(soln)	1007	DAT file (24292381.dat)	?	39°53'32.90820"N	105°11'54.24231"W	5934.993sft

C10(soln) 1007	DAT file (24292382.dat)	?	39°53'32.95675"N	105°11'54.20288"W	5927.974sft
C14(soln) 1007	DAT file (24292383.dat)	?	39°53'32.90502"N	105°11'54.22422"W	5911.592sft
C18(soln) 1007	DAT file (24292384.dat)	?	39°53'32.85744"N	105°11'54.29064"W	5930.155sft
C8(soln) 1008	DAT file (58502382.dat)	?	39°53'06.60390"N	105°11'44.62147"W	5809.653sft
C17(soln) 1008	DAT file (15532382.dat)	?	39°53'06.53959"N	105°11'44.67178"W	5804.621sft
C12(soln) 1005	DAT file (58502383.dat)	?	39°53'46.71974"N	105°12'28.63941"W	5962.550sft
C16(soln) 1005	DAT file (58502384.dat)	?	39°53'46.66465"N	105°12'28.65196"W	5946.897sft
C13(soln) 1006	DAT file (15532381.dat)	?	39°54'02.97354"N	105°12'14.79980"W	5920.926sft
C21(soln) 1006	DAT file (15532383.dat)	?	39°54'02.90906"N	105°12'14.80692"W	5931.885sft
C15(soln) 1010	DAT file (53962382.dat)	?	39°53'46.84561"N	105°11'14.56982"W	5850.734sft
C19(soln) 1010	DAT file (53962383.dat)	?	39°53'46.78804"N	105°11'14.63203"W	5868.447sft
C23(soln) 1010	DAT file (53962383.dat)	?	39°53'46.78649"N	105°11'14.57321"W	5862.796sft
C20(soln) 1011	DAT file (58502385.dat)	?	39°53'02.01175"N	105°11'14.29206"W	5858.064sft
C24(soln) 1011	DAT file (58502386.dat)	?	39°53'02.00325"N	105°11'14.22799"W	5851.346sft
C29(soln) 1011	DAT file (58502387.dat)	?	39°53'02.03944"N	105°11'14.14872"W	5859.532sft
C22(soln) 1009	DAT file (24292385.dat)	?	39°54'04.02821"N	105°10'51.31953"W	5716.434sft
C31(soln) 1009	DAT file (24292386.dat)	?	39°54'04.02740"N	105°10'51.20448"W	5719.723sft
C25(soln) 10	DAT file (15532371.dat)	?	39°55'40.63738"N	105°13'59.93412"W	5847.186sft
C30(soln) 1015	DAT file (15532384.dat)	?	39°54'43.08882"N	105°05'50.31010"W	5511.138sft

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Coordinate System Details

Project : FLATS-CONTROL-NET-NAD-83

User name	jjung	**Date & Time**	7:17:29 AM 9/28/2005
Coordinate System	US State Plane 1983	**Zone**	Colorado Central 0502
Project Datum	NAD 1983 (Conus)		
Vertical Datum		**Geoid Model**	GEOID99 (Conus)
Coordinate Units	US survey feet		
Distance Units	US survey feet		
Height Units	US survey feet		

Coordinate System

Coordinate System : US State Plane 1983
Zone : Colorado Central 0502
Datum : NAD 1983 (Conus)
Ellipsoid Name : Geodetic Ref System 1980
Geoid Model : GEOID99 (Conus)
Site : Not selected

Ellipsoid
Ellipsoid Name : Geodetic Ref System 1980
Flattening 1/f : 298.257
Semi Major Axis : 20925604.474sft

Datum Transformation : Three Parameter
WGS84 to Geodetic Ref System 1980
Translation X : 0.000sft Rotation X : N/A
Translation Y : 0.000sft Rotation Y : N/A
Translation Z : 0.000sft Rotation Z : N/A
Scale Factor : N/A ppm

Lambert Conformal Conic Two Parallel Projection
Projection Origin False Origin
Latitude : 37°50'00.00000"N False Northing : 1000000.000sft
Longitude : 105°30'00.00000"W False Easting : 3000000.000sft
Height : N/A False Elevation : N/A
Scale Factor : N/A

Shift grid name : None
Azimuth at projection centre : N/A
Azimuth at equator : N/A
Projection Parallel 1 : 39°45'00.00000"N
Projection Parallel 2 : 38°27'00.00000"N
Projection Ferro Constant : N/A
Projection Point 1 Latitude : N/A
Projection Point 1 Longitude : N/A
Projection Point 2 Latitude : N/A
Projection Point 2 Longitude : N/A
Projection grid name : N/A

Local site settings
Project latitude : N/A
Project longitude : N/A
Project height : N/A
Ground scale factor : N/A
False northing offset : N/A
False easting offset : N/A

GPS Site Calibration Details

Horizontal Adjustment
North Origin : N/A Translation North : N/A
East Origin : N/A Translation East : N/A
Scale : N/A Rotation : N/A

Vertical Adjustment
North Origin : N/A
East Origin : N/A

Vertical constant correction : N/A
Slope North : N/A
Slope East : N/A

Network Adjustment Parameters
Longitude Deflection : ?
Latitude Deflection : ?
Azimuth Rotation : 0°00'00.426579"
Network Scale : 0.99999916
Distance Scale : 1.00000000
Distance Constant : 0.00000000sft
Height Constant : 0.00000000sft

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Network Adjustment Report

Project : FLATS-CONTROL-NET-NAD-83

User name	jjung	**Date & Time**	10:23:05 AM 9/28/2005
Coordinate System	US State Plane 1983	**Zone**	Colorado Central 0502
Project Datum	NAD 1983 (Conus)		
Vertical Datum		**Geoid Model**	GEOID99 (Conus)
Coordinate Units	US survey feet		
Distance Units	US survey feet		
Height Units	US survey feet		

Adjustment Style Settings - 95% Confidence Limits

Residual Tolerances

To End Iterations : 0.000033sft
Final Convergence Cutoff : 0.016404sft

Covariance Display

Horizontal
Propagated Linear Error [E] : U.S.
Constant Term [C] : 0.00000000sft
Scale on Linear Error [S] : 1.96

Three-Dimensional
Propagated Linear Error [E] : U.S.
Constant Term [C] : 0.00000000sft
Scale on Linear Error [S] : 1.96

Elevation Errors were used in the calculations.

Adjustment Controls

Compute Correlations for Geoid : False

Horizontal and Vertical adjustment performed

Set-up Errors

GPS
Error in Height of Antenna : 0.000sft
Centering Error : 0.000sft

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Statistical Summary

Successful Adjustment in 1 iteration(s)

Network Reference Factor : 1.00
Chi Square Test (α=95%) : PASS
Degrees of Freedom : 34.00

GPS Observation Statistics

Reference Factor : 1.00
Redundancy Number (r) : 34.00

Individual GPS Observation Statistics

Observation ID	Reference Factor	Redundancy Number
B1	1.03	1.49
B5	1.46	0.82
B6	1.32	0.95
B8	1.28	1.52
B11	1.40	1.26
B12	0.46	1.58
B13	0.48	0.95
B14	1.22	2.09
B18	1.19	0.63
B20	0.63	1.22
B21	0.47	0.78
B23	0.77	2.18
B25	1.53	2.30
B27	1.36	1.07
B28	0.94	1.66
B31	0.34	1.18
B35	0.73	1.35

B36	1.08	1.60
B37	0.65	1.79
B38	0.37	1.97
B39	0.48	1.90
B43	0.97	1.76
B46	1.23	1.95

Weighting Strategies

GPS Observations
User-defined Scalar Applied to All Observations

Scalar : 2.67

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Adjusted Coordinates

Adjustment performed in WGS-84

Number of Points : 13
Number of Constrained Points : 2
Horizontal and Height Only : 2

Adjusted Grid Coordinates

Errors are reported using 1.96σ.

Point Name	Northing	N error	Easting	E error	Elevation	e error	Fix
1003	1750481.766sft	0.016sft	3080651.026sft	0.019sft	N/A	N/A	
1004	1749813.815sft	0.016sft	3082752.124sft	0.021sft	N/A	N/A	
1002	1749384.202sft	0.016sft	3079824.628sft	0.020sft	N/A	N/A	
1001	1747376.888sft	0.017sft	3079339.680sft	0.023sft	N/A	N/A	
1008	1747442.626sft	0.018sft	3085394.300sft	0.024sft	N/A	N/A	
1007	1750102.121sft	0.017sft	3084635.336sft	0.021sft	N/A	N/A	
1005	1751485.849sft	0.017sft	3081947.333sft	0.020sft	N/A	N/A	
1006	1753139.167sft	0.021sft	3083021.528sft	0.020sft	N/A	N/A	
1010	1751523.094sft	0.023sft	3087721.785sft	0.022sft	N/A	N/A	
1011	1746991.763sft	0.021sft	3087764.048sft	0.026sft	N/A	N/A	
1009	1753270.843sft	0.025sft	3089530.499sft	0.023sft	N/A	N/A	

10	1763000.772sft	0.000sft	3074799.454sft	0.000sft	N/A	N/A	N E h
1015	1757316.703sft	0.000sft	3112964.130sft	0.000sft	N/A	N/A	N E h

Adjusted Geodetic Coordinates

Errors are reported using 1.96σ.

Point Name	Latitude	N error	Longitude	E error	Height	h error	Fix
1003	39°53'36.72332"N	0.016sft	105°12'45.29771"W	0.019sft	5990.273sft	0.020sft	
1004	39°53'30.05598"N	0.016sft	105°12'18.36994"W	0.021sft	5957.465sft	0.022sft	
1002	39°53'25.90271"N	0.016sft	105°12'55.94389"W	0.020sft	6012.517sft	0.020sft	
1001	39°53'06.08102"N	0.017sft	105°13'02.24531"W	0.023sft	5983.988sft	0.020sft	
1008	39°53'06.53735"N	0.018sft	105°11'44.57550"W	0.024sft	5799.348sft	0.026sft	
1007	39°53'32.84397"N	0.017sft	105°11'54.19804"W	0.021sft	5924.269sft	0.026sft	
1005	39°53'46.60497"N	0.017sft	105°12'28.62560"W	0.020sft	5958.635sft	0.026sft	
1006	39°54'02.90895"N	0.021sft	105°12'14.77482"W	0.020sft	5933.080sft	0.032sft	
1010	39°53'46.78312"N	0.023sft	105°11'14.53899"W	0.022sft	5863.528sft	0.036sft	
1011	39°53'02.00231"N	0.021sft	105°11'14.19690"W	0.026sft	5851.907sft	0.036sft	
1009	39°54'03.99246"N	0.025sft	105°10'51.25482"W	0.023sft	5711.255sft	0.046sft	
10	39°55'40.61368"N	0.000sft	105°13'59.89777"W	0.000sft	5849.920sft	0.000sft	Lat Long h
1015	39°54'43.05405"N	0.000sft	105°05'50.35674"W	0.000sft	5502.847sft	0.000sft	Lat Long h

Coordinate Deltas

Point Name	ΔNorthing	ΔEasting	ΔElevation	ΔHeight	ΔGeoid Separation
1003	0.000sft	0.000sft	N/A	0.000sft	N/A
1004	0.000sft	0.000sft	N/A	0.000sft	N/A
1002	0.000sft	0.000sft	N/A	0.000sft	N/A
1001	0.000sft	0.000sft	N/A	0.000sft	N/A
1008	0.000sft	0.000sft	N/A	0.000sft	N/A
1007	0.000sft	0.000sft	N/A	0.000sft	N/A
1005	0.000sft	0.000sft	N/A	0.000sft	N/A
1006	0.000sft	0.000sft	N/A	0.000sft	N/A
1010	0.000sft	0.000sft	N/A	0.000sft	N/A
1011	0.000sft	0.000sft	N/A	0.000sft	N/A

1009	0.000sft	0.000sft	N/A	0.000sft	N/A
10	0.000sft	0.000sft	N/A	0.000sft	N/A
1015	0.000sft	0.000sft	N/A	0.000sft	N/A

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Control Coordinate Comparisons

Values shown are control coord minus adjusted coord.

Point Name	ΔNorthing	ΔEasting	ΔElevation	ΔHeight
10	N/A	N/A	N/A	N/A
1015	N/A	N/A	N/A	N/A

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Adjusted Observations

Adjustment performed in WGS-84

GPS Observations

GPS Transformation Group: <GPS Default>

Azimuth Rotation : 0°00'00.4266" **(1.96σ)** : 0°00'00.2529"
Network Scale : 0.99999916 **(1.96σ)** : 0.00000070
Number of Observations : 23
Number of Outliers : 0

Observation Adjustment (Critical Tau = 3.17). Any outliers are in red.

Obs. ID	From Pt.	To Pt.		Observation	A-posteriori Error (1.96σ)	Residual	Stand. Residual
B5	1003	1002	Az.	217°09'32.0074"	0°00'00.9962"	0°00'00.2124"	0.63
			ΔHt.	22.249sft	0.013sft	0.009sft	2.14
			Dist.	1373.848sft	0.006sft	-0.001sft	-0.90
B25	1008	1007	Az.	344°15'51.8484"	0°00'00.4003"	0°00'00.0388"	0.08
			ΔHt.	124.926sft	0.014sft	-0.020sft	-1.01
			Dist.	2765.586sft	0.008sft	-0.017sft	-2.02
B14	1004	1003	Az.	287°49'18.8385"	0°00'00.5227"	-0°00'00.2099"	-0.51
			ΔHt.	32.813sft	0.014sft	-0.002sft	-0.18

			Dist.	2204.644sft	0.005sft	0.008sft	1.97
B27	1011	1008	**Az.**	280°58'10.6424"	0°00'01.3923"	-0°00'00.2090"	-0.30
			ΔHt.	-52.554sft	0.031sft	0.015sft	0.87
			Dist.	2412.184sft	0.010sft	0.006sft	1.84
B46	1009	1015	**Az.**	80°24'18.9477"	0°00'00.3301"	0°00'00.0422"	0.21
			ΔHt.	-208.403sft	0.046sft	-0.120sft	-1.72
			Dist.	23779.483sft	0.032sft	-0.028sft	-0.99
B6	1002	1001	**Az.**	193°45'41.0998"	0°00'00.5991"	0°00'00.1722"	0.75
			ΔHt.	-28.524sft	0.014sft	0.008sft	1.69
			Dist.	2064.998sft	0.007sft	-0.003sft	-1.22
B18	1003	1005	**Az.**	52°25'15.6415"	0°00'00.9481"	-0°00'00.0017"	-0.01
			ΔHt.	-31.633sft	0.019sft	-0.010sft	-1.56
			Dist.	1639.640sft	0.007sft	-0.002sft	-1.01
B11	1008	1007	**Az.**	344°15'51.8484"	0°00'00.4003"	-0°00'00.2677"	-1.53
			ΔHt.	124.926sft	0.014sft	0.003sft	0.45
			Dist.	2765.586sft	0.008sft	0.004sft	0.92
B36	1011	1010	**Az.**	359°39'46.7381"	0°00'00.5553"	0°00'00.4845"	1.41
			ΔHt.	11.627sft	0.032sft	-0.022sft	-1.06
			Dist.	4531.385sft	0.017sft	0.011sft	1.18
B8	1001	1004	**Az.**	54°38'47.7652"	0°00'00.3761"	-0°00'00.1581"	-0.76
			ΔHt.	-26.517sft	0.016sft	0.012sft	1.37
			Dist.	4193.124sft	0.006sft	0.001sft	0.17
B23	1005	1007	**Az.**	117°25'21.7694"	0°00'00.7023"	0°00'00.6477"	0.85
			ΔHt.	-34.362sft	0.020sft	-0.016sft	-1.19
			Dist.	3023.154sft	0.009sft	0.007sft	0.65
B35	1009	1011	**Az.**	195°54'50.1430"	0°00'00.4869"	0°00'00.0951"	0.40
			ΔHt.	140.657sft	0.042sft	0.024sft	1.12
			Dist.	6522.612sft	0.021sft	0.008sft	0.78
B1	1003	1004	**Az.**	107°49'01.5684"	0°00'00.5227"	0°00'00.1069"	0.39
			ΔHt.	-32.803sft	0.012sft	-0.005sft	-0.90
			Dist.	2204.644sft	0.005sft	-0.003sft	-1.10
B20	1006	1010	**Az.**	109°09'39.5216"	0°00'00.7124"	0°00'00.2348"	0.66
			ΔHt.	-69.546sft	0.026sft	-0.008sft	-0.90
			Dist.	4970.157sft	0.013sft	0.005sft	0.73

B43	1015	1011	Az.	247°58'29.0922"	0°00'00.2541"	0°00'00.0943"	0.83
			ΔHt.	349.065sft	0.036sft	0.029sft	0.59
			Dist.	27232.313sft	0.036sft	0.009sft	0.42
B37	10	1003	Az.	155°06'58.0026"	0°00'00.1506"	-0°00'00.0229"	-0.24
			ΔHt.	140.358sft	0.020sft	-0.009sft	-0.77
			Dist.	13818.553sft	0.016sft	0.009sft	0.83
B21	1006	1005	Az.	213°11'57.6470"	0°00'01.3848"	0°00'00.1780"	0.34
			ΔHt.	25.561sft	0.021sft	0.004sft	0.81
			Dist.	1971.572sft	0.014sft	-0.002sft	-0.46
B12	1001	1008	Az.	89°33'22.4782"	0°00'00.3702"	0°00'00.0555"	0.23
			ΔHt.	-184.635sft	0.020sft	0.002sft	0.13
			Dist.	6054.793sft	0.007sft	0.003sft	0.78
B28	1007	1010	Az.	65°28'09.7803"	0°00'00.9456"	-0°00'00.1378"	-0.24
			ΔHt.	-60.735sft	0.031sft	0.020sft	0.77
			Dist.	3397.732sft	0.013sft	-0.005sft	-0.58
B13	1004	1007	Az.	81°28'55.4664"	0°00'00.7961"	-0°00'00.1438"	-0.66
			ΔHt.	-33.192sft	0.016sft	0.003sft	0.49
			Dist.	1905.092sft	0.006sft	0.000sft	0.15
B39	10	1002	Az.	159°54'42.1866"	0°00'00.1382"	0°00'00.0322"	0.34
			ΔHt.	162.602sft	0.020sft	-0.007sft	-0.57
			Dist.	14513.720sft	0.016sft	-0.003sft	-0.27
B31	1006	1009	Az.	89°01'39.6650"	0°00'00.6659"	-0°00'00.0528"	-0.19
			ΔHt.	-221.820sft	0.042sft	-0.001sft	-0.05
			Dist.	6510.081sft	0.016sft	-0.004sft	-0.51
B38	10	1001	Az.	163°57'52.6375"	0°00'00.1240"	-0°00'00.0423"	-0.47
			ΔHt.	134.073sft	0.020sft	0.005sft	0.37
			Dist.	16269.621sft	0.017sft	0.000sft	0.03

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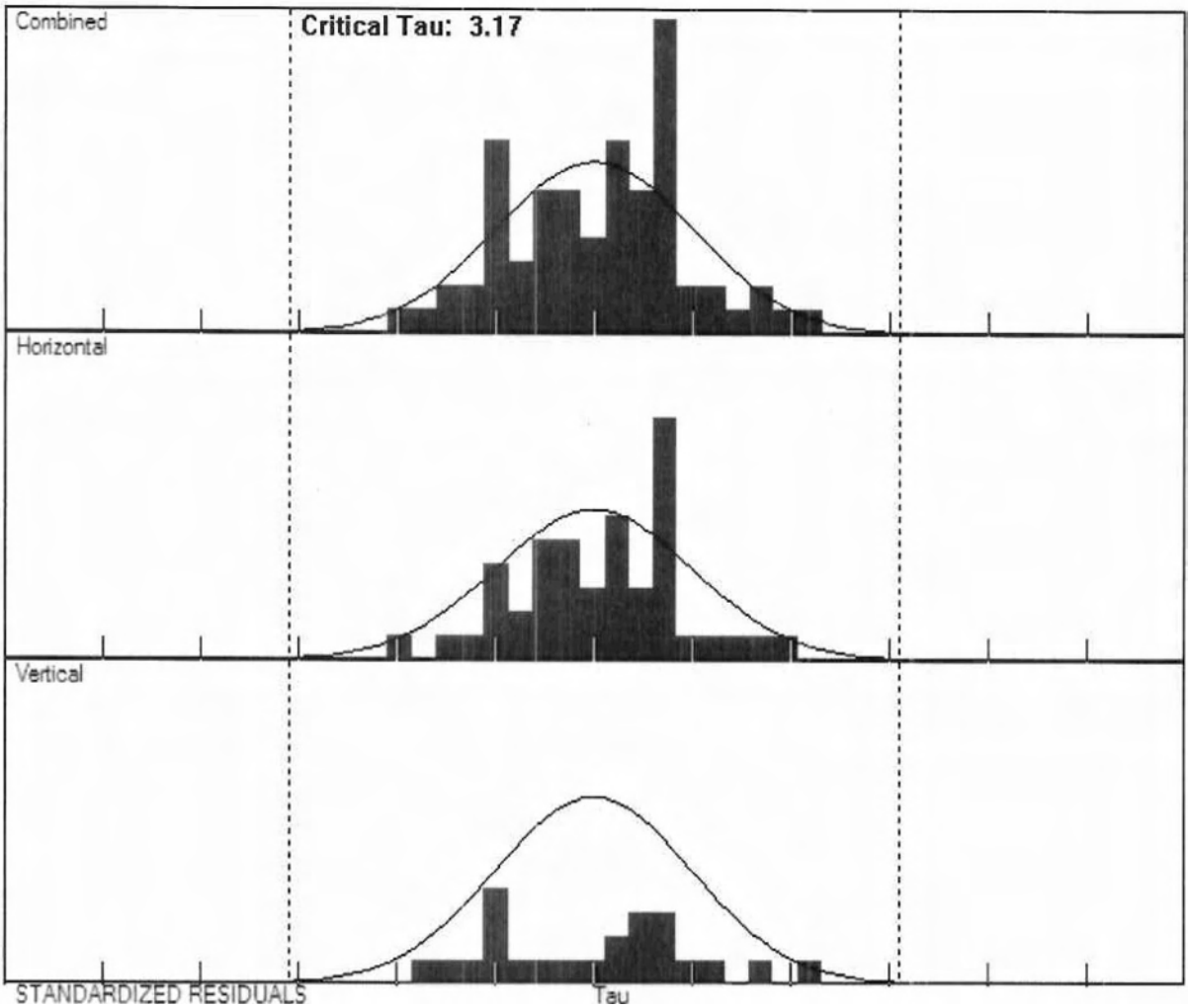
Histograms of Standardized Residuals



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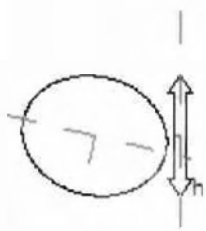
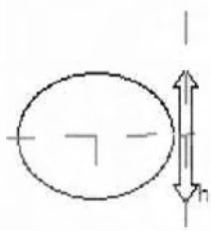
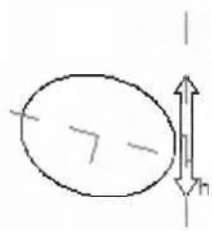
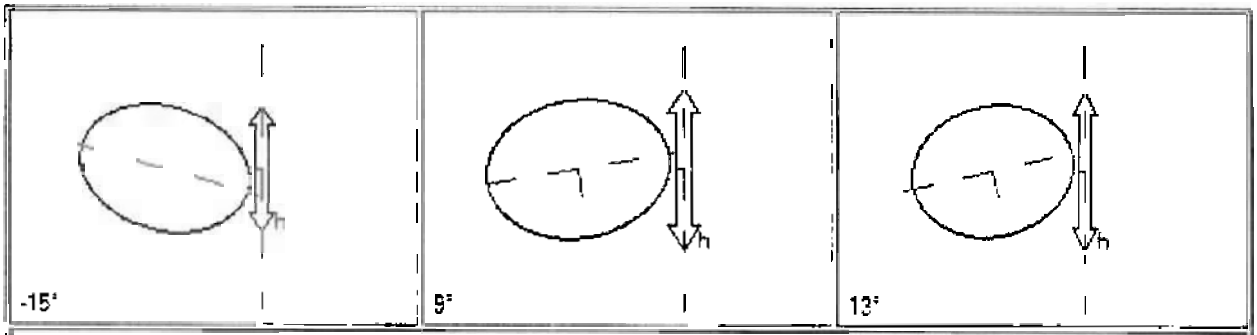
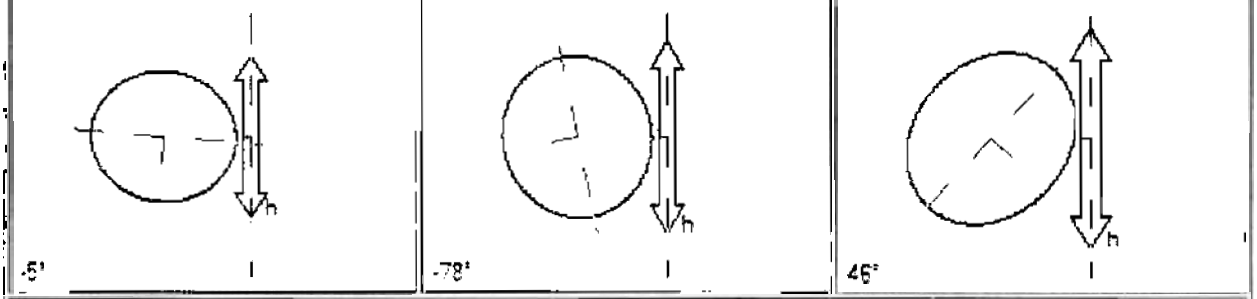
Point Error Ellipses

1003	1004	1002
		
-13'	1'	-15'
Tick Size: 0.0100sft Horizontal Bivariate Scalar: 2.45σ Vertical Univariate Scalar: 1.96σ		
1001	1008	1007



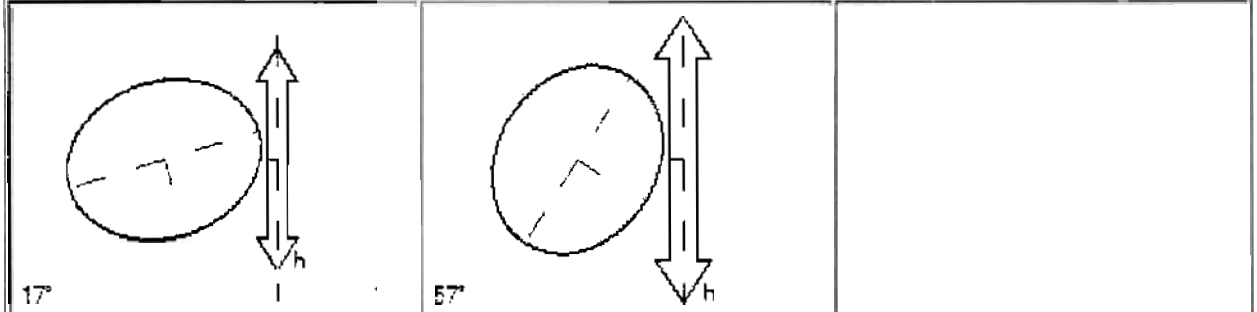
Tick Size: 0.0100sft Horizontal Bivariate Scalar: 2.45σ Vertical Univariate Scalar: 1.96σ

1005	1006	1010



Tick Size: 0.0100sft Horizontal Bivariate Scalar: 2.45σ Vertical Univariate Scalar: 1.96σ

1011	1009	



Tick Size: 0.0100sft Horizontal Bivariate Scalar: 2.45σ Vertical Univariate Scalar: 1.96σ

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Covariant Terms

Adjustment performed in WGS-84

From Point	To Point		Components	A-posteriori Error (1.96σ)	Horiz. Precision (Ratio)	3D Precision (Ratio)
1003	1004	Az.	107°49'01.1418"	0°00'00.5669"	1:436619	1:436619
		ΔHt.	-32.808sft	0.012sft		
		ΔElev.	?	?		
		Dist.	2204.646sft	0.005sft		
1003	1002	Az.	217°09'31.5808"	0°00'01.0173"	1:239337	1:239337

		ΔHt.	22.244sft	0.013sft		
		ΔElev.	?	?		
		Dist.	1373.849sft	0.006sft		
1003	1005	Az.	52°25'15.2149"	0°00'00.9684"	1:224331	
		ΔHt.	-31.638sft	0.019sft		
		ΔElev.	?	?		
		Dist.		0.007sft		
1003	10	Az.	335°07'45.4389"	0°00'00.2711"	1:805239	
		ΔHt.	-140.353sft	0.020sft		
		ΔElev.	?	?		
		Dist.	13818.565sft	0.017sft		
1004	1001	Az.	234°39'15.4756"	0°00'00.4388"	1:624099	1:624099
		ΔHt.	26.522sft	0.015sft		
		ΔElev.	?	?		
		Dist.	4193.128sft	0.007sft		
1004	1007	Az.	81°28'55.0399"	0°00'00.8124"	1:317241	1:317241
		ΔHt.	-33.197sft	0.017sft		
		ΔElev.	?	?		
		Dist.	1905.094sft	0.006sft		
1002	1001	Az.	193°45'40.6732"	0°00'00.6529"	1:287666	1:287666
		ΔHt.	-28.529sft	0.014sft		
		ΔElev.	?	?		
		Dist.	2065.000sft	0.007sft		
1002	10	Az.	339°55'22.7911"	0°00'00.2724"	1:824120	1:824120
		ΔHt.	-162.597sft	0.020sft		
		ΔElev.	?	?		
		Dist.	14513.733sft	0.018sft		
1001	1008	Az.	89°33'22.0516"	0°00'00.4104"	1:780226	1:780226
		ΔHt.	-184.640sft	0.020sft		
		ΔElev.	?	?		
		Dist.	6054.799sft	0.008sft		
1001	10	Az.	343°58'29.1971"	0°00'00.2714"	1:886642	1:886642
		ΔHt.	-134.068sft	0.020sft		
		ΔElev.	?	?		

		Dist.	16269.634sft	0.018sft		
1008	1007	Az.	344°15'51.4218"	0°00'00.4664"	1:357045	1:357045
		ΔHt.	124.921sft	0.015sft		
		ΔElev.	?	?		
		Dist.	2765.588sft	0.008sft		
1008	1011	Az.	100°57'50.7358"	0°00'01.3537"	1:255954	1:255954
		ΔHt.	52.559sft	0.031sft		
		ΔElev.		?		
		Dist.	2412.186sft	0.009sft		
1007	1005	Az.	297°25'43.4237"	0°00'00.7364"	1:328791	1:328791
		ΔHt.	34.367sft	0.021sft		
		ΔElev.	?	?		
		Dist.	3023.157sft	0.009sft		
1007	1010	Az.	65°28'09.3537"	0°00'00.9514"	1:256768	1:256768
		ΔHt.	-60.740sft	0.031sft		
		ΔElev.	?	?		
		Dist.	3397.735sft	0.013sft		
1005	1006	Az.	33°11'48.3361"	0°00'01.3813"	1:137095	1:137095
		ΔHt.	-25.556sft	0.022sft		
		ΔElev.	?	?		
		Dist.	1971.574sft	0.014sft		
1006	1010	Az.	109°09'39.0950"	0°00'00.7539"	1:368512	1:368512
		ΔHt.	-69.551sft	0.026sft		
		ΔElev.	?	?		
		Dist.	4970.161sft	0.013sft		
1006	1009	Az.	89°01'39.2385"	0°00'00.6521"	1:421385	1:421385
		ΔHt.	-221.825sft	0.041sft		
		ΔElev.	?	?		
		Dist.	6510.086sft	0.015sft		
1010	1011	Az.	179°39'46.0921"	0°00'00.6020"	1:262778	1:262778
		ΔHt.	-11.622sft	0.033sft		
		ΔElev.	?	?		
		Dist.	4531.389sft	0.017sft		
1011	1009	Az.	15°54'35.0026"	0°00'00.5409"	1:307826	1:307826

		ΔHt.	-140.652sft	0.042sft		
		ΔElev.	?	?		
		Dist.	6522.617sft	0.021sft		
1011	1015	Az.	67°55'00.9474"	0°00'00.1564"	1:1037324	1:1037324
		ΔHt.	-349.060sft	0.036sft		
		ΔElev.	?	?		
		Dist.	27232.336sft	0.026sft		
1009	1015	Az.	80°24'18.5211"	0°00'00.2072"	1:1015089	1:1015089
		ΔHt.	-208.408sft	0.046sft		
		ΔElev.	?	?		
		Dist.	23779.503sft	0.023sft		

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